tive humidity. Without going into details it can be stated that practically the same argument applies to the other days and places.

From a consideration of the various statistics from different localities that have come under the writer's notice, it seems that sunstroke is as frequently associated with a very low relative humidity as it is with a very high relative humidity. Apparently the first one to call attention to the occurrence of sunstroke with a low relative humidity was Dr. A. J. Miles, of Cincinnati, in a paper read before the American Public Health Association in 1881 ("Sunstroke Epidemic of Cincinnati," Public Health, Vol. VII), and this present paper confirms his statements.

RELATIVE HUMIDITY INSIDE AND OUTSIDE OF BUILDINGS.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

In Weather Bureau Bulletin No. 19—Report on the Relative Humidity of New England and Certain Other Localities—some results are given of observations on the relative humidity within and without the Weather Bureau building in Washington, D. C. The conclusion there reached was that outside hygrometric observations could not be depended upon to give the humidity conditions within, except when the temperatures outside and inside were substantially the same.

The observations, as will be seen by a reference to the bulletin above mentioned, consisted in a simple determination of the relative humidity of the air in the observer's office and in the standard thermometer shelter on the roof. They were continued from the date of publication of the bulletin above mentioned, April 22, with a few interruptions, to June 18, 1896.

The new material confirms in a general way the conclusion heretofore reached. It is worthy of mention, however, that while there is close agreement between the relative humidity inside and outside, so long as the temperatures are the same, many cases will arise when the inside and outside temperatures differ by a considerable amount even in the warmer part of the year.

The greatest differences between the relative humidity inside and outside are found when the outside air is saturated, or nearly so, and, also, after a period of rain, when the temperature of the outside air has fallen considerably below the temperature of the room. During the period included between the dates above mentioned the differences between outside and inside (outside—inside) ranged from 36 per cent below to 28 per cent above; that is to say, the inside fell 36 per cent below the outside on one occasion and rose 28 per cent above it on another.

On 14 days out of the 45 (31 per cent of the time) the variation was over 10 per cent at the hour of observation, 2 p. m.

It is obvious, from a consideration of the weather conditions at the time some of the greatest differences were observed, that better ventilation, or perhaps a more perfect mechanical mixture of the air outside and inside, would have resulted in a closer agreement between the calculated humidity values.

The observations were made originally for the purpose of determining how far the ordinary hygrometric observations made in standard roof shelters could be safely used as indicating the probable moisture conditions in cotton mills in the immediate vicinity. It has been shown that the variation in a closed room is much smaller than in the open air as would naturally be expected, and that the agreement between the humidity of a room and that of the outside air depends almost wholly upon the amount of ventilation and the temperature of the room. It is possible, of course, to increase the moisture in a room much beyond the natural amount, but it will always be necessary to provide for a renewal of the air at short intervals, since the limit of endurance in a still, hot and damp atmosphere is soon reached.

Relative humidity inside and outside of the Weather Bureau building, Washington, D. C.

Date.	Dry thermometer.		Wet thermometer.		Relative humidity.	
	Inside.	Outside.	Inside.	Outside.	Inside.	Outside.
1896.	°	°	°	°	*Per ct.*	*Per ct.*
March 2	72.0	39.0	54.0	36.0	28	75
4	67.5	38.0	50.0	32.0	26	50
5	71.0	41.5	52.0	36.0	24	58
6	74.0	45.5	54.0	40.5	33	64
7	74.0	60.5	56.0	54.5	30	68
9	73.0	46.5	54.0	42.5	25	72
10	70.0	45.0	53.5	39.5	27	61
11	71.0	33.5	56.0	33.5	37	100
12	69.5	27.5	52.0	23.5	26	54
13	72.0	30.0	55.0	27.0	31	67
14	72.0	32.2	53.5	26.0	26	38
16	72.0	33.5	57.0	33.5	38	100
17	68.0	37.0	53.0	33.0	34	66
19	73.0	62.0	63.0	58.0	57	79
20	70.0	36.5	54.0	32.0	33	62
21	73.0	43.0	55.5	39.0	30	70
27	72.0	40.0	55.0	32.0	31	38
28	74.0	49.5	54.0	41.0	33	46
31	74.0	58.0	38.0	50.0	36	56
Mean	71.7	42.0	53.7	37.3	32	64
April 7	70.0	41.0	53.0	34.0	29	46
8	73.0	66.0	54.0	38.0	25	46
9	66.0	50.0	51.0	40.0	32	38
10	72.0	43.0	58.0	40.5	42	81
11	75.0	47.0	60.0	44.0	40	79
12						
13	80.0	79.0	65.0	65.0	44	47
14	82.0	88.0	67.0	69.5	43	49
15	79.0	81.0	62.0	62.0	37	33
16	84.0	86.0	66.0	68.0	38	39
17	88.0	91.5	70.0	71.5	40	37
18	89.0	91.0	69.5	70.5	36	37
21	81.0	81.0	65.0	65.0	41	41
22	74.0	63.5	55.5	49.0	28	32
Mean	77.9	69.5	61.2	55.2	37	47
May 2	73.0	63.0	65.0	60.0	65	84
4	74.0	75.5	66.0	60.0	66	38
5	81.0	82.5	65.0	64.5	41	36
6	74.0	56.0	64.0	49.5	58	63
7	69.0	63.0	57.0	52.0	47	46
9	78.0	87.5	70.0	69.0	67	38
11	90.0	91.5	69.5	68.0	36	28
12	86.0	86.0	66.5	66.0	35	34
13	77.8	77.8	67.0	66.2	57	54
14	75.0	74.0	70.0	69.0	78	78
16	79.2	77.0	56.7	57.5	41	28
18	88.0	91.0	74.0	68.0	52	30
20	72.0	56.0	64.0	55.5	65	97
21	69.8	63.0	63.8	61.0	72	89
22	75.8	76.0	70.8	71.8	78	82
23	75.7	75.0	64.0	63.5	52	53
25	71.0	68.0	64.8	63.0	71	76
26	77.3	80.0	71.0	71.5	73	66
27	78.0	79.0	66.2	65.0	54	47
28	78.0	85.5	70.0	73.5	67	56
29	75.0	73.0	61.0	58.0	44	39
30	74.0	73.5	61.0	61.0	47	48
Mean	76.9	75.2	65.8	63.3	58	55
June 1	73.0	72.0	61.3	57.6	51	40
2	72.7	71.7	60.0	57.0	47	39
3	74.8	74.0	61.0	60.0	45	43
4	77.0	66.0	66.0	64.0	54	90
5	75.2	73.8	68.0	65.8	69	66
6	80.5	80.5	67.5	67.5	51	51
8	86.0	87.5	76.0	75.0	57	57
9	80.0	77.0	71.0	68.5	64	65
10	72.5	76.5	60.0	66.0	47	57
11	76.0	77.0	65.0	60.0	55	35
12	78.0	81.5	61.0	61.5	36	30
13	73.0	62.3	65.0	65.8	65	82
15	71.0	68.5	64.5	62.5	70	73
16	73.5	72.5	68.5	67.5	78	78
17	75.0	74.5	69.0	68.5	74	74
18	78.0	79.4	68.0	69.0	60	59
Mean	76.0	74.7	65.7	64.8	58	59

AUTOMATIC CLOUD PHOTOGRAPHY.

By OLIVER L. FASSIG, Observer, Weather Bureau.

The following interesting items are quoted from a letter recently received by the Editor from Mr. Oliver L. Fassig:

Through the kindness of Dr. von Bezold and Professor Sprung, I spent the whole of the month of October at the Potsdam Observatory, and took part in the daily observations of cloud height and velocity which are being carried on there in accordance with the International

Cloud Committee. Photographs are taken with the phototheodolite every two hours from daylight to dusk. Already over 500 plates are ready for measurement. I assisted daily in the cloud photography, and also measured some of the plates and calculated the heights and velocities, both by formula and by a very convenient graphic method which is to be used in most of the work. I found this month's work most interesting and profitable. There is a great field for good work in this direction. The method is far more reliable than that of the direct theodolite work, and more convenient. The expense of maintaining a few such stations is not great where the work can be done in connection with stations already established.

An interesting experiment has just been tried at the Potsdam Observatory in the way of an automatic apparatus for cloud photography. The first cloud picture was made about two weeks ago. The method proves to be entirely feasible. The apparatus weighs fully 1,000 pounds. It is built of brass, and is inclosed in a case about 5 feet by 2 feet by 2 feet. The first impression on looking at it is one of bewilderment at the complication of wheels, levers, and chains; but everything is solidly built, and apparently will not easily get out of repair. The apparatus is entirely automatic. You simply "press the button and the machine does all the rest." About twenty photographic plates are put into one end of it to start with. Immediately on closing the electric circuit a large weight begins to descend in both machines (there are of course two similar machines, one at each station and electrically connected). The descent of this weight opens the outside lid of the case, which protects the apparatus against the weather. As soon as this is done the shutter of the objective opens and closes, giving about a half second exposure of the plates. This done, an endless chain is set in motion which carries the exposed plate to the forward end of the case and at the same time brings a fresh plate from the rear and places it in position under the objective ready for the next exposure. This done, the lid closes and a bell rings as a signal that the performance is over. The apparatus is restricted to the taking of one zenith and two horizon exposures at an angle of 90°. The other two horizon exposures could be added, but this would further complicate the apparatus. These two automatic machines are soon to replace the two phototheodolites now in use. No observer will be necessary at the substation, as the man at the principal station decides upon the time and the portion of the sky to be photographed and closes the circuit which automatically sets both machines in motion. The present form of this automatic apparatus is not likely to come into general use, as it is too complicated and expensive. The cost will probably reach $1,000 for each machine. The phototheodolites can probably be purchased for about $200 each, and have a greater range of usefulness.

THE BALLOON ASCENSIONS OF NOVEMBER 14, 1896.

By Dr. R. ASSMANN, of Berlin.

In the November REVIEW, page 415, we have noticed the temperature results of the simultaneous balloon ascensions, as published by Mascart in the Paris *Comptes Rendus*, and by Lancaster in *Ciel et Terre*, and have drawn some conclusions therefrom. We are indebted to Dr. Assmann and Mr. Oliver L. Fassig for an early copy of the *Anzeiger*, Berlin, November 23, from which we copy the following interesting account of the work done on the 14th of November:

After a short sketch of the recent history of the progress of meteorological ballooning, in which he gives full credit to Hermite and Besançon for their work with sounding balloons, and states that the Berlin scientists promptly followed the example of their French colleagues, Assmann says:

In Paris, Berlin, and St. Petersburg, for some time past everything had been ready for a simultaneous ascension, while in Strasburg and Munich preparations were quickly made after the close of the Meteorological Conference in Paris in September. Therefore the proposition emanating from Paris to make a first experiment in this direction during the night of November 13-14 met with general approbation. The identity of methods of observation must, of course, be considered as the most important condition for the attainment of comparable results; therefore, Strasburg and Berlin ordered self-registering apparatus at once from the famous firm of Richard Bros., in Paris, and which were properly tested by Hermite and Besançon.

The experiments were made in the following manner: In Paris the new balloon "Aerophile III," constructed by Besançon out of very light varnished silk and containing 400 cubic meters, ascended at 2 h. 6 m. (?a. m.). At the same time, that is to say, at 2 h. 22 m., the balloon "Strasburg" of 320 cubic meters ascended from Strasburg. At 2 h. 51 m., the 250 cubic meter balloon "Cirrus," also made of varnished silk, ascended from Berlin; but in consequence of its former employment as a military balloon and of the damages it had sustained in six previous ascensions, among them the highest as yet made, 20,000 meters, it was full of breaks and repairs.

In addition to these there was sent up at St. Petersburg a similar registering balloon whose dimensions are not yet known to the writer. As complementary to these balloons, which were destined for the highest altitudes, other ascensions were made by balloons manned by aeronauts and equipped for scientific observations; of these the balloon "Akademie," with Dr. Erk, as observer, ascended at Munich at 6 h. 47 m. (?a. m.); at 2 h. 44 m., and therefore nearly simultaneous with the registering balloon "Cirrus," the military balloon "Bussard," of 1,300 cubic meters capacity, ascended at Berlin with First Lieutenant von Kehler as aeronaut, and Berson, the well-known "German Glaisher," as meteorologist; at 3 h. 15 m. a military balloon ascended at Warsaw, and at 4 a. m. a similar one at St. Petersburg.

Thus, therefore, except at Munich, the ascensions were nearly simultaneous at all places; that is to say at about 2 o'clock, Paris time, simultaneously from Paris to St. Petersburg, seven balloons equipped for scientific purposes were floating in the air, one at Paris, Strasburg, and Warsaw, and two at Berlin and St. Petersburg, respectively. The following accounts of these ascensions and their results have been received.

The registration balloon, ascending at St. Petersburg, attained only an altitude of 1,500 meters when it burst; the military balloon, manned by observers, attained 5,000 meters altitude and a temperature of the air of —27° C., or according to another telegram, only —24° C.; after a voyage of eight hours it descended near Pskoff, southwest of St. Petersburg, at a distance of 260 kilometers. At Warsaw, by order of the Russian Minister of War, a second military balloon ascended which was driven by a north-northwest wind into Galicia, where it descended near Brzozoff, at a distance of 300 kilometers from Warsaw; nothing has yet been learned as to the altitude and temperature attained in this voyage nor the time of its duration. The balloon sent up by the Munich Association for Aeronautics attained its greatest altitude at 3,400 meters, and descended after a voyage of seven and one-quarter hours, in the neighborhood of Lungitz, near Linz in Austria, having traveled 200 kilometers almost directly eastward from the point of ascent; nothing is yet known as to the observed temperatures. The registration balloon "Strasburg," ascending from Strasburg, after a voyage of an hour and a half (during which it attained 8,000 meters altitude and a minimum temperature of —30° C.) descended in the Black Forest, where it was soon afterwards found. (The movement was, therefore, in an easterly direction.) It is peculiar that the registration of the lowest temperature, —30°, C., occurred at the altitude of 6,000 meters, and that higher temperatures were shown at greater altitudes.

At Paris the registration balloon "Aerophile III" ascended in calm but cloudy weather and took a direction toward the north-northeast, but disappeared from view in a few seconds. To the greatest anxiety of all interested nothing was heard of this balloon for many days, so that it was feared that it had fallen into the North Sea. Because of some remarkable phenomena reported from Wulferstedt and Ummendorf, localities lying west of Madgeburg, it was believed that the missing balloon might have some connection therewith, since a journey of about 800 kilometers could not be considered improbable. In fact, our registration balloon "Cirrus" in its first voyage had landed in Bosnia, having described 1,000 kilometers in ten hours. After all instructions had been sent out for seeking the balloon in that region the agreeable news was received that "Aerophile III," after a voyage of five and a half hours had descended near Graide, in Belgium, 235 kilometers northeast of Paris; it had attained an altitude of about 15,000 meters and temperature of —63° C.

The registration balloon "Cirrus," starting from Schoenberg near Berlin (which in its six previous voyages had penetrated higher into the atmosphere than any other piece of apparatus made by human hands, and in its flight towards Bosnia had attained 15,500 meters, toward Minsk, in Russia, 18,300, and toward the Danish island, Lolland, had attained 21,000) now made its last, its funeral voyage. The balloon material (varnished silk) frequently mended, and become defective, could no longer stand the great resistance of the air, due to the rapid ascent, and at 6,000 meters altitude it split, so that after an hour's voyage it sank to the earth. In consideration of the circumstance that the registration apparatus ordered from Paris, had been received only a few hours before the voyage, and could, therefore, not be again compared with the standard, two registers—a barograph and a thermograph, similar to our home apparatus—were, for the sake of certainty, fastened with the Paris instrument in the basket that carried the apparatus, and which was wrapped in a bright metallic paper (blank Nickel-papier); by this addition the weight was increased by many kilograms, but on account of the buoyancy of the pure hydrogen gas used by the Aeronautic Corps of the Army, this would not have prevented the balloon from attaining the height of 16,000 or 17,000 meters if it had not been brought to a premature descent by the above-mentioned break in the material. This precaution proved to be very advantageous, for, by reason of some one of the unavoidable shocks attending the preparation for the ascent the recording pen of the French thermograph must have become loosened from its fastening so that this part of the apparatus did not work. On the other hand, the German thermograph from the workshop of R. Fuess, in Steglitz, which had been carefully tested a few days before, showed in a very interesting way that the temperature rose from —4° C., near the earth's